

AMENDMENTS TO THE CLAIMS

Please amend the present application as follows:

Claims

1. (Currently amended) A packaging device for a semiconductor die, the packaging device comprising:

a substantially planar substrate having opposed major surfaces;

~~located on one of the major surfaces; a~~ an electrically conductive die mounting pad located on one of the major surfaces of the substrate, the conductive die mounting pad dimensioned to accommodate the die with a major surface of the die in contact therewith;

a first electrically conductive connecting pad located on the other of the major surfaces ~~of the substrate, the first electrically conductive connecting pad dimensioned to conform to an industry standard pad layout of a printed circuit board; and~~

a first electrically conductive interconnecting element extending through the substrate and electrically interconnecting the mounting pad and the first electrically conductive connecting pad;

an electrically conductive bonding pad located on the one of the major surfaces of the susbtrate;

a second electrically conductive connecting pad located on the other of the major surfaces of the susbtrate; and

a second electrically conductive interconnecting element extending through the substrate and electrically interconnecting the bonding pad and the second electrically conducting connecting pad.

2. (Currently amended) The packaging device of claim 1, in which the substrate comprises one of a ceramic material and a material selected from epoxy laminate and silicon.

3. (Canceled)

4. (Currently amended) The packaging device of claim 1, in which the mounting pad and the first electrically conductive connecting pad each comprise at least one of copper, silver, gold, nickel and tungsten.

5. (Currently amended) The packaging device of claim 1, in which the first electrically conductive interconnecting element comprises tungsten.

6- 10. (Canceled)

11. (Currently amended) A semiconductor device, comprising:
a semiconductor die comprising metallization on at least a portion of a bottom surface of the die;
a substantially planar substrate having opposed major surfaces;
located on one of the major surfaces, a conductive die mounting pad dimensioned to accommodate the semiconductor die;
a conductive connecting pad located on the other of the major surfaces; and
a conductive interconnecting element extending through the substrate and electrically interconnecting the mounting pad and the connecting pad;
in which the semiconductor die is mounted on the die mounting pad whereby an electrical connection is formed between the metallization on the at least a portion of the bottom surface of the die and with a major surface thereof in contact with the mounting pad.

12. (Original) The semiconductor device of claim 11, in which the substrate comprises ceramic.

13. (Original) The semiconductor device of claim 11, in which the substrate comprises a material selected from epoxy laminate and silicon.

14. (Original) The semiconductor device of claim 11, in which the mounting pad and the connecting pad each comprise at least one of copper, silver, gold, nickel and tungsten.

15. (Original) The semiconductor device of claim 11, in which the conductive interconnecting element comprises tungsten.

16. (Currently amended) The semiconductor device of claim 11, additionally comprising:
a conductive bonding pad smaller in area than the die mounting pad, the bonding pad

located on the one of the major surfaces;
an additional conductive connecting pad located on the other of the major surfaces;
an additional conductive interconnecting element extending through the substrate and electrically interconnecting the bonding pad and the additional connecting pad, and;
the semiconductor die additionally comprising metallization on at least a portion of a top surface of the die; and
a bonding wire extending between the metallization on the at least a portion of the top surface of the semiconductor die and the bonding pad.

17. (Original) The semiconductor device of claim 16, additionally comprising an encapsulant encapsulating the semiconductor die and at least a portion of the major surface of the substrate on which the mounting pad is located.

18. (Original) The semiconductor device of claim 16, in which the substrate comprises a material selected from ceramic, epoxy laminate and silicon.

19. (Original) The semiconductor device of claim 16, in which the mounting pad, the bonding pad and the connecting pads each comprise at least one of copper, silver, gold, nickel and tungsten.

20. (Original) The semiconductor device of claim 16, in which the conductive interconnecting element comprises tungsten.

21. (New) A semiconductor device, comprising:
a substantially planar substrate having opposed major surfaces;
an electrically conductive mounting pad located on one of the major surfaces of the substrate;
a semiconductor die having a metallized bottom major surface that is mounted on the electrically conductive mounting pad;
a first electrically conductive connecting pad located on the other of the major surfaces of the substrate; and
a first electrically conductive interconnecting element extending through the substrate and electrically interconnecting the mounting pad and the first electrically conductive connecting pad.

22. (New) The semiconductor device of claim 21 wherein the semiconductor die comprises a light emitting diode (LED) and the metallized bottom major surface comprises one of an anode and a cathode of the LED.

23. (New) The semiconductor device of claim 21, further comprising:
an electrically conductive bonding pad located on the one of the major surfaces of the substrate;
a bonding wire extending between a metallized top major surface of the semiconductor die and the electrically conductive bonding pad;
a second electrically conductive connecting pad located on the other of the major surfaces of the substrate; and
a second electrically conductive interconnecting element extending through the substrate and electrically interconnecting the bonding pad and the second connecting pad.

24. (New) The semiconductor device of claim 23 wherein the semiconductor die comprises a light emitting diode (LED), the metallized top major surface comprises a first electrode of the LED and the metallized bottom major surface comprises a second electrode of the LED.

25. (New) The semiconductor device of claim 21 wherein the first electrically conductive interconnecting element is selected to withstand an operating temperature when the semiconductor die is mounted on the electrically conductive mounting pad and to provide a low-resistance electrical connection between the mounting pad and the first electrically conductive connecting pad.

26. (New) The semiconductor device of claim 25, wherein the first electrically conductive interconnecting element comprises tungsten.

27. (New) The semiconductor device of claim 25, wherein the first electrically conductive interconnecting element comprises a slug of electrically conductive material, the slug having a diameter selected to press-fit the slug into a through hole located in the substrate between the mounting pad and the first electrically conductive connecting pad.